FLUOR DANIEL

Fluor Daniel Hanford, Inc.
P.O. Box 1000
Richland, WA 99352

RECEIVED
JAN 27 2000
EDMC

December 3, 1999

FDH-9958911

DEC 1999

Ms. J. H. Kessner, Program Manager
Analytical Services
Bechtel Hanford, Inc. H9-03
Post Office Box 969
Richland, Washington 99352

Dear Ms. Kessner:

INTERIM RESULTS FOR THE 233-S PLUTONIUM CONCENTRATION FACILITY (233-S) SAMPLE – SDG 5

References: (1) HNF-SD-CD-QAPP-016, Rev. 3C, "222-S Laboratory Quality Assurance Plan," Waste Management Federal Services of Hanford, Inc., Richland, Washington, 1999.

(2) Letter, T. E. Logan, BHI, to J. L. Jacobsen, FDH, "Letter of Instruction for the 233-S Plutonium Concentration Facility Sample Analysis," BHI-047467, dated November 24, 1998.

This letter presents the interim results for the sample that was received from the 233-S Facility on October 4, 1999. Sample B0WCH7 was analyzed for polychlorinated biphenyls (PCBs), mercury and the radionuclides indicated on the attached copy of the chain of custody (COC) form in accordance with the *Letter of Instruction for the 233-S Plutonium Concentration Facility Sample Analysis* (LOI), referenced above. The Interim Data Summary report is included as Attachment 1.

Attachment 2 provides the sample breakdown diagrams. The chain-of-custody forms are included in Attachment 3.

Material that appeared to be paint chips were observed in the sample. Therefore, analysis for polychlorinated biphenyls (PCB) was performed. A result of 652 µg/g of Aroclor 1254 was obtained. This value is above the regulated limit of 50 ppm, so the remaining sample digests and the waste generated from the analyses will require handling as "Known PCB."

The request for analysis received via e-mail on September 30, 1999, Attachment 4, listed TCLP metals. The level of alpha activity from plutonium in sample B0WCH7 was too high to allow an adequate sample size to be extracted by this method. Therefore, metals were analyzed by inductively coupled plasma (ICP) and cold vapor atomic absorption (CVAA) for mercury (Hg).

Concentrations obtained by these methods can be compared to the regulatory thresholds by dividing the results by 20 to account for the absence of the TCLP extraction.

Sample Appearance and Handling

The sample looked mainly like a brown/gray dry mixture of sand and dust with some rust-like material dispersed throughout. There were also gray colored flakes that looked similar to paint chips that were present in previously received samples. The sample was blended in a high-speed blender for approximately fifteen minutes after which it was a homogeneous brown colored fine dry powder.

Analytical Results

Note that the sum of the alpha emitters is about 18% to 20% higher than the total alpha result. This is typically caused by traces of solids on the alpha sample mounts. We believe that these are the best results that we can get based on the work involved with digesting the samples that we received.

Holding Times

The SW-846 holding times were not met for mercury Hg (28 days), PCB extraction (7 days), nitrate, and nitrite (48 hours). Except for Hg, the holding times expired during the 24-day delay between September 10, 1999 (sampling date) and October 4, 1999 (sample receipt at the laboratory).

The laboratory was not able to perform the Hg analysis within 4 days of sample receipt because of the extra time required to perform the initial sample handling in the glovebox. An additional delay was encountered, following the observation of paint chips in the sample, while the lab waited for direction to proceed by handling the sample as "Suspect PCB". However, for this sample exceeding the holding time for Hg does not invalidate the characterization because the concentration found exceeds the regulatory threshold.

Quality Control Results

Standard Recovery

All standard recoveries were acceptable in accordance with the 222-S Laboratory Quality Assurance Plan (Markel 1999) except for the isotopes reported by inductively coupled plasma/mass spectroscopy (ICP/MS) analysis.

The standard recovery for Si was 156.2%. This standard frequently has a high percent recovery due to etching from the glassware during the acid digestion. The reported recovery falls within the historical statistical 3-sigma recovery range of 25% - 225% calculated for that standard. Since the customer did not specifically request Si, the results were accepted.

For the ICP/MS analysis, the standards for neptunium-237, plutonium-239 and americium-241 were high. This was due to the semi-quantitative nature of the indirect calibration that was used. The laboratory does not currently have a method for direct calibration for isotopic actinide analysis by ICP/MS.

Preparation Blanks

Low levels of contamination from strontium-90 (^{90}Sr), aluminum, boron, calcium, chromium, iron, sodium, nickel, sulfur, and silicon were detected in acid digest preparation blank. For all analytes, except ^{90}Sr, the level detected in the blank was less than 1% of the sample result and was considered insignificant.

For the ^{90}Sr, the result reported for the blank was approximately 80% of the sample result. The activity of ^{90}Sr detected in the sample was very small so that the slight amount of contamination in the blank was significant in comparison. A larger sample size could not be used because the high concentration of americium in the sample makes the ^{90}Sr separation more difficult. The issue was discussed with the customer contact and a decision was made to accept the results.

Low levels of chloride and nitrite were detected in the water digest preparation blank. However, the levels were less than 1% of the sample results and were considered insignificant.

Practical Quantitation Limits (PQL)

For the GEA analytes, the laboratory was unable to meet the practical quantitation limits (PQLs) listed in the LOI. The high beta activity in the sample required that a dilution be made to reduce the "dead time" of the detector. This dilution increased the detection limits for all analyses.

Attachments

Attachment 1: Interim Data Summary Report
Attachment 2: Sample Breakdown Diagrams
Attachment 3: Chain-of-Custody forms
Attachment 4: Correspondence

If you have any questions, please call me at 373-4314.

Sincerely,

R. A. Esch, Project Coordinator
222-S Laboratory
Technology, Operations and Process Science

Attachments (4)

FDH-9958911

Attachment 1

Interim Data Summary Report

3 pages including cover page

INTERIM

Interim Results Report
233S SDG5

CORE NUMBER: n/a
SEGMENT #: B0WCH7

SEGMENT PORTION: B0WCH7 PCBS

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S99M000408			Aroclor-1232	ug/Kg	n/a	<200.0	<2.75e+04	n/a	n/a	n/a	n/a	2.75e+04	n/a
S99M000408			Aroclor-1242	ug/Kg	n/a	<200.0	<2.75e+04	n/a	n/a	n/a	n/a	2.75e+04	n/a
S99M000408			Aroclor-1248	ug/Kg	n/a	<200.0	<2.75e+04	n/a	n/a	n/a	n/a	2.75e+04	n/a
S99M000408			Aroclor-1254	ug/Kg	76.75	<200.0	6.52e+05	n/a	n/a	n/a	n/a	2.75e+04	n/a
S99M000408			Aroclor-1260	ug/Kg	n/a	<200.0	<2.75e+04	n/a	n/a	n/a	n/a	2.75e+04	n/a
S99M000408			Tetrachloro-m-xylene Surr	% Recovery	77.50	103.2	< 1.000	n/a	n/a	n/a	n/a	1.000	n/a
S99M000408			Decachlorobiphenyl Surr	% Recovery	94.50	124.5	< 1.000	n/a	n/a	n/a	n/a	1.000	n/a

H2O DIGEST: H2O DIGEST

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S99M000406		W	Fluoride-IC-Dionex 4000/4500	ug/g	97.97	<1.20e-02	53.90	n/a	n/a	n/a	n/a	42.86	n/a
S99M000406		W	Chloride-IC-Dionex 4000/4500	ug/g	95.00	2.20e-02	2.53e+04	n/a	n/a	n/a	n/a	60.71	n/a
S99M000406		W	Nitrite-IC - Dionex 4000/4500	ug/g	88.35	3.35e-01	5.58e+02	n/a	n/a	n/a	n/a	385.7	n/a
S99M000406		W	Bromide by Ion Chromatograph	ug/g	97.60	<1.25e-01	<4.46e+02	n/a	n/a	n/a	n/a	446.4	n/a
S99M000406		W	Nitrate by IC-Dionex 4000/4500	ug/g	105.8	<1.39e-01	2.03e+03	n/a	n/a	n/a	n/a	496.4	n/a
S99M000406		W	Phosphate-IC-Dionex 4000/4500	ug/g	97.17	<1.20e-01	<4.29e+02	n/a	n/a	n/a	n/a	428.6	n/a
S99M000406		W	Sulfate by IC-Dionex 4000/4500	ug/g	97.25	<1.38e-01	1.61e+04	n/a	n/a	n/a	n/a	492.9	n/a
S99M000406		W	Oxalate-IC-Dionex 4000/4500	ug/g	99.43	<1.05e-01	1.20e+03	n/a	n/a	n/a	n/a	375.0	n/a

HG ANALYSIS: HG ANALYSIS

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S99M000405			Mercury by CVAA (PE) with FIAS	ug/g	104.4	<8.00e-05	1.11e+02	n/a	n/a	n/a	n/a	1.142	n/a

INTERIM

Interim Results Report
233S SDG5

CORE NUMBER: n/a
SEGMENT #: n/a

SEGMENT PORTION: ACID DIGEST

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S99M000407		A	Strontium-89/90 High Level	uCi/g	98.55	5.00e-03	6.09e-03	n/a	n/a	n/a	n/a	3.00e-03	4.05E+01
S99M000407		A	Pu-239/240 by TRU-SPEC Resin	uCi/g	100.8	<953.0	8.08e+03	n/a	n/a	n/a	n/a	1.32e+03	2.64E+00
S99M000407		A	Pu-238 by Ion Exchange	uCi/g	n/a	<953.0	2.41e+03	n/a	n/a	n/a	n/a	1.32e+03	4.46E+00
S99M000407		A	Np237 by TTA Extraction	uCi/g	89.18	<4.33e-03	1.530	n/a	n/a	n/a	n/a	7.00e-03	1.75E+00
S99M000407		A	Thorium-229 by ICP/MS	ug/g	n/a	<1.42e-02	< 88.09	n/a	n/a	n/a	n/a	88.10	n/a
S99M000407		A	Thorium-230 by ICP/MS	ug/g	n/a	<1.96e-02	<1.21e+02	n/a	n/a	n/a	n/a	121.2	n/a
S99M000407		A	Thorium-232 by ICP/MS	ug/g	117.0	<1.88e-02	<1.17e+02	n/a	n/a	n/a	n/a	116.6	n/a
S99M000407		A	Neptunium-237 by ICP/MS	ug/g	154.9	<1.96e-02	3.65e+03	n/a	n/a	n/a	n/a	121.2	n/a
S99M000407		A	Plutonium-239 by ICP/MS	ug/g	161.0	<3.06e-02	1.43e+05	n/a	n/a	n/a	n/a	189.7	n/a
S99M000407		A	Plutonium-240 by ICP/MS	ug/g	n/a	<1.63e-02	1.99e+04	n/a	n/a	n/a	n/a	101.1	n/a
S99M000407		A	Plutonium-242 by ICP/MS	ug/g	n/a	<8.20e-03	1.37e+03	n/a	n/a	n/a	n/a	50.83	n/a
S99M000407		A	Pu/Am-241 by ICP/MS	ug/g	188.3	<3.11e-03	5.05e+03	n/a	n/a	n/a	n/a	19.26	n/a
S99M000407		A	Am 243/Cm 243 by ICP/MS	ug/g	n/a	<1.35e-02	< 83.74	n/a	n/a	n/a	n/a	83.74	n/a
S99M000407		A	Pu 244/Cm 244 by ICP/MS	ug/g	n/a	<7.93e-03	< 49.18	n/a	n/a	n/a	n/a	49.17	n/a
S99M000407		A	Silver -ICP-Acid Digest	ug/g	90.10	<1.00e-02	22.40	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407		A	Aluminium -ICP-Acid Digest	ug/g	98.80	1.14e-01	2.54e+04	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Arsenic -ICP-Acid Digest	ug/g	93.80	<1.00e-01	< 72.80	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Boron -ICP-Acid Digest	ug/g	107.0	6.03e-01	2.36e+02	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Barium -ICP-Acid Digest	ug/g	98.20	<5.00e-02	3.95e+02	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Beryllium -ICP-Acid Digest	ug/g	97.20	<5.00e-03	< 3.640	n/a	n/a	n/a	n/a	3.640	n/a
S99M000407		A	Bismuth -ICP-Acid Digest	ug/g	94.20	<1.00e-01	1.07e+03	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Calcium -ICP-Acid Digest	ug/g	99.20	2.19e-01	1.16e+04	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Cadmium -ICP-Acid Digest	ug/g	92.80	<5.00e-03	4.08e+02	n/a	n/a	n/a	n/a	3.640	n/a
S99M000407		A	Cerium -ICP-Acid Digest	ug/g	100.6	<1.00e-01	1.84e+02	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Cobalt -ICP-Acid Digest	ug/g	94.60	<2.00e-02	62.30	n/a	n/a	n/a	n/a	14.50	n/a
S99M000407		A	Chromium -ICP-Acid Digest	ug/g	95.60	6.50e-02	8.28e+03	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407		A	Copper -ICP-Acid Digest	ug/g	97.60	<1.00e-02	1.12e+03	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407		A	Iron -ICP-Acid Digest	ug/g	98.00	3.23e-01	1.18e+05	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Potassium -ICP-Acid Digest	ug/g	98.40	<5.00e-01	2.86e+03	n/a	n/a	n/a	n/a	364.0	n/a
S99M000407		A	Lanthanum -ICP-Acid Digest	ug/g	100.8	<5.00e-02	< 36.40	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Lithium -ICP-Acid Digest	ug/g	100.8	<1.00e-02	17.30	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407		A	Magnesium -ICP-Acid Digest	ug/g	95.40	<1.00e-01	7.79e+03	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Manganese -ICP-Acid Digest	ug/g	90.60	<1.00e-02	7.26e+02	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407		A	Molybdenum -ICP-Acid Digest	ug/g	95.20	<5.00e-02	98.80	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Sodium -ICP-Acid Digest	ug/g	120.0	1.140	8.05e+03	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Neodymium -ICP-Acid Digest	ug/g	102.2	<1.00e-01	< 72.80	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Nickel -ICP-Acid Digest	ug/g	95.20	2.80e-02	1.32e+03	n/a	n/a	n/a	n/a	14.50	n/a
S99M000407		A	Phosphorus -ICP-Acid Digest	ug/g	95.60	<2.00e-01	2.15e+03	n/a	n/a	n/a	n/a	145.0	n/a
S99M000407		A	Lead -ICP-Acid Digest	ug/g	89.60	<1.00e-01	< 72.80	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Sulfur -ICP-Acid Digest	ug/g	92.20	1.11e-01	1.00e+04	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Antimony -ICP-Acid Digest	ug/g	92.40	<6.00e-02	< 43.70	n/a	n/a	n/a	n/a	43.70	n/a
S99M000407		A	Selenium -ICP-Acid Digest	ug/g	93.60	<1.00e-01	2.13e+02	n/a	n/a	n/a	n/a	72.80	n/a
S99M000407		A	Silicon -ICP-Acid Digest	ug/g	156.2	7.36e-01	2.75e+03	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407		A	Samarium -ICP-Acid Digest	ug/g	101.4	<1.00e-01	1.29e+02	n/a	n/a	n/a	n/a	72.80	n/a

INTERIM

Sample# R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S99M000407	A	Strontium -ICP-Acid Digest	ug/g	98.80	<1.00e-02	83.10	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407	A	Titanium-ICP-Acid Digest	ug/g	99.40	<1.00e-02	4.45e+02	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407	A	Thallium -ICP-Acid Digest	ug/g	92.80	<2.00e-01	<1.46e+02	n/a	n/a	n/a	n/a	145.0	n/a
S99M000407	A	Uranium -ICP-Acid Digest	ug/g	99.80	<5.00e-01	6.25e+04	n/a	n/a	n/a	n/a	364.0	n/a
S99M000407	A	Vanadium -ICP-Acid Digest	ug/g	96.80	<5.00e-02	3.35e+02	n/a	n/a	n/a	n/a	36.40	n/a
S99M000407	A	Zinc -ICP-Acid Digest	ug/g	91.40	<1.00e-02	5.88e+03	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407	A	Zirconium -ICP-Acid Digest	ug/g	98.80	<1.00e-02	< 7.280	n/a	n/a	n/a	n/a	7.280	n/a
S99M000407	A	Cobalt-60 by GEA	uCi/g	111.3	<1.87e-02	<5.81e-02	n/a	n/a	n/a	n/a	5.80e-02	n/a
S99M000407	A	Antimony-125 by GEA	uCi/g	n/a	<4.70e-02	<1.76e-01	n/a	n/a	n/a	n/a	1.76e-01	n/a
S99M000407	A	Cesium-134 by GEA	uCi/g	n/a	<1.65e-02	<5.62e-02	n/a	n/a	n/a	n/a	5.60e-02	n/a
S99M000407	A	Cesium-137 by GEA	uCi/g	100.6	<2.16e-02	<7.41e-02	n/a	n/a	n/a	n/a	7.40e-02	n/a
S99M000407	A	Europium-152 by GEA	uCi/g	n/a	<3.84e-02	<1.75e-01	n/a	n/a	n/a	n/a	1.75e-01	n/a
S99M000407	A	Europium-154 by GEA	uCi/g	n/a	<5.56e-02	<2.04e-01	n/a	n/a	n/a	n/a	2.04e-01	n/a
S99M000407	A	Europium-155 by GEA	uCi/g	n/a	<2.85e-02	<2.61e-01	n/a	n/a	n/a	n/a	2.61e-01	n/a
S99M000407	A	Radium-226 by GEA	uCi/g	n/a	<3.72e-01	< 1.390	n/a	n/a	n/a	n/a	1.390	n/a
S99M000407	A	Actinium-228 by GEA	uCi/g	n/a	<1.10e-01	<3.52e-01	n/a	n/a	n/a	n/a	3.52e-01	n/a
S99M000407	A	Americium-241 by GEA	uCi/g	n/a	<2.53e-02	6.69e+03	n/a	n/a	n/a	n/a	n/a	0.0700
S99M000407	A	Am-241 by Extraction	uCi/g	100.9	<893.0	7.86e+03	n/a	n/a	n/a	n/a	1.25e+03	3.13E+00
S99M000407	A	Cm-243/244 by Extraction	uCi/g	n/a	<893.0	<1.25e+03	n/a	n/a	n/a	n/a	1.25e+03	1.00E+02
S99M000407	A	Alpha of Digested Solid	uCi/g	101.8	<33.20	1.56e+04	n/a	n/a	n/a	n/a	70.40	3.05E+00
S99M000407	A	Beta of Solid Sample	uCi/g	104.1	<113.0	2.53e+03	n/a	n/a	n/a	n/a	231.0	1.08E+01

INTERIM

FDH-9958911

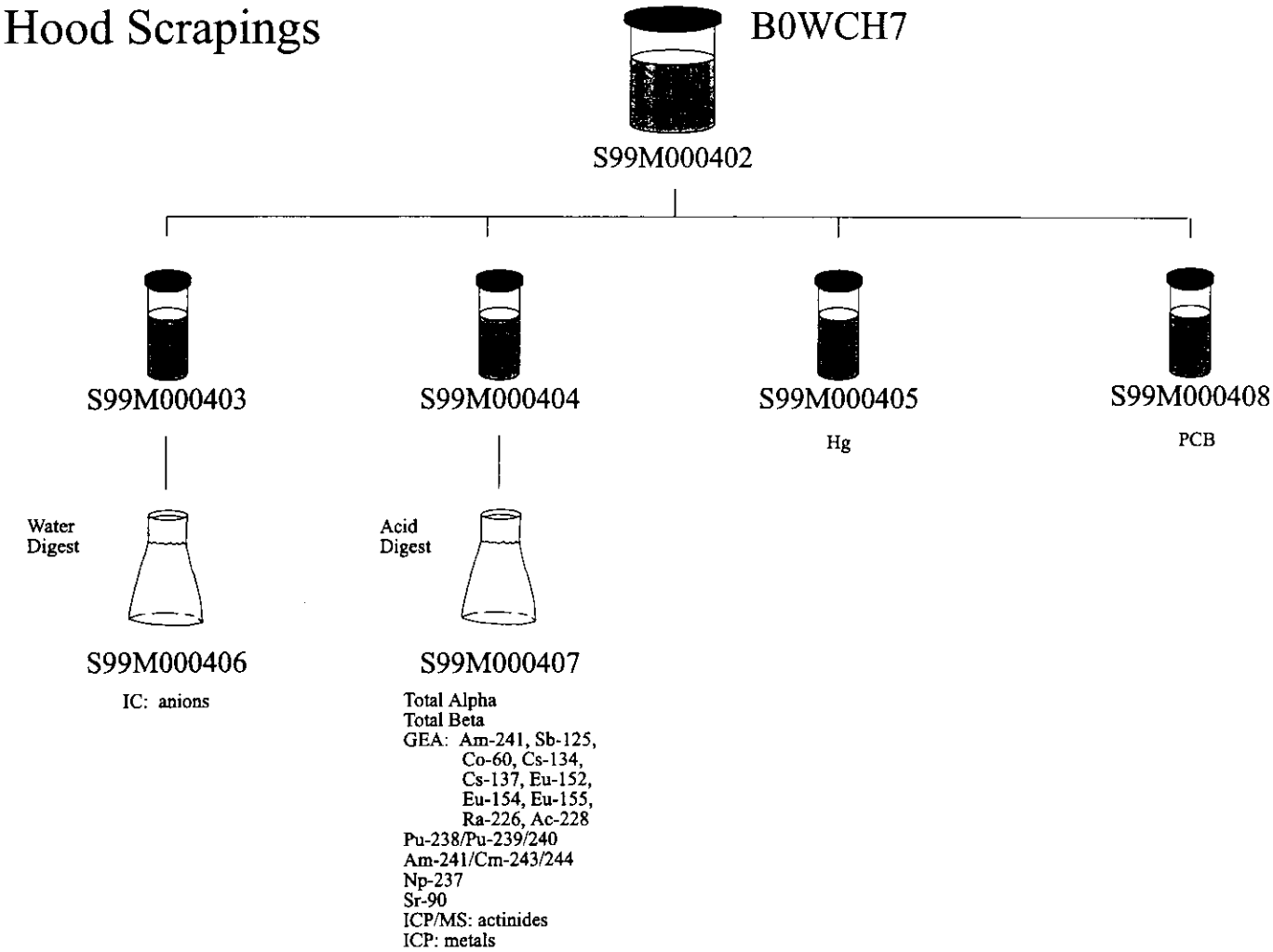
Attachment 2

Sample Breakdown Diagrams

2 pages including cover page

233-S Pu Concentration Facility Samples

SDG5
Process Hood Scrapings



FDH-9958911

Attachment 3

Chain-of-Custody Forms

2 pages including cover page

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B99-024-15	Page 1 of 1
Collector S Hint Elledge / T. Davis		**Company Contact** D Encke	**Telephone No.** 373-3461	**Project Coordinator** TRENT, SJ	**Price Code** IV/FE **Data Turnaround**
Project Designation 233-S Plutonium Concentration Facility Process Areas - Ot		**Sampling Location** 233S		**SAF No.** B99-024	
Ice Chest No. 2335-99-001		**Field Logbook No.** EL 1435		**Method of Shipment** Hand Delivered	
Shipped To 222-S Lab Operations		**Offsite Property No.**		**Bill of Lading/Air Bill No.**	
				COA R2335T200C	

POSSIBLE SAMPLE HAZARDS/REMARKS Special Handling and/or Storage	Preservation	none	None	None	None	None	None	none			
	Type of Container	P	P	P	P	P	P	P			
	No. of Container(s)	0	0	0	0	0	1	0			
	Volume	100g	100g	100g	100g	100g	100g	100g			

SAMPLE ANALYSIS				Neptunium-237	Americium-241/Curium-244	Gross Alpha, Gross Beta	Isotopic Plutonium	Strontium-90	See item (1) in Special Instructions.	ICP MS			
Sample No.	Matrix *	Sample Date	Sample Time										
B0WCH7 S9909080402	Other Solid	9-10-99	1200	X	X	X	X	X	X	X			

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
JL Davis	9-30-99 13:05	RS Fahlberg	9-30-99 1305
RS Fahlberg	10-4-99 1540	RT Stecle	10/4/99 1540
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

Matrix *
- Soil
- Water
- Vapor
- Other Solid
- Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

FDH-9958911

Attachment 4

Correspondence

2 pages including cover page

Esch, Ruth A

From: Powell, Katherine L
Sent: Thursday, September 30, 1999 12:02 PM
To: Trent, Stephen J
Cc: Esch, Ruth A; Prilucik, John R
Subject: RE: High Pu sample analysis

From: **Trent, Stephen J**
Sent: Thursday, September 30, 1999 11:18 AM
To: Powell, Katherine L
Subject: High Pu sample analysis
Importance: High

Kathy:

The customer would like the following analyses performed on the high Pu sample -

> GEA (report Pu), Gross Alpha, Gross Beta, ICP/MS Actinides, Pu-iso, Americium/Curium, Np-237, TCLP metals, anions, and Sr-90

Also, we would like the rad as soon as possible; hopefully the GEA can be run in less than a week, and the rest of the isotopic work done within two weeks??

Steve